



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/937,858	09/28/2001	Yuji Matsuda	Y-189	7097

7590 06/16/2003
Dellett & Walters
Suite 1101
310 SW Fourth Avenue
Portland, OR 97204

EXAMINER

MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
----------	--------------

2853

DATE MAILED: 06/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/937,858

Applicant(s)

MATSUDA, YUJI

Examiner

Blaise L Mouttet

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 6,9,16 and 17 is/are allowed.
- 6) ☒ Claim(s) 1-5,7,8 and 10-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-5, 7, 8 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cobbs et al. US 5,600,350 in view of Goetz et al. US 5,170,416.

Cobbs et al. discloses, regarding claim 1, an image forming device that forms an image on a print paper (30) in an ink jet recording method with a plurality of heads (102, 104, 106, 108), comprising:

main scanning direction moving means (figure 2, column 4, lines 23-31) for moving a carriage (100) in a main scanning direction, said carriage (100) having said plurality of heads (102, 104, 106, 108) mounted thereon;

paper conveying means (figure 3, column 4, lines 46-58) for conveying the print paper (30) in a sub-scanning direction;

pattern printing means (107) for printing, with at least one head, a test pattern including predetermined pattern elements (figure 5, column 5, lines 29-35);

pattern detecting means (200), mounted on said carriage (100), for detecting the pattern elements of the test pattern printed on the print paper by said printing means (107) (column 5, lines 7-15);

binary conversion means (304, figure 10) for binarizing an output of said pattern detection means (200);

position detection means (an optical reader) for detecting a position of the carriage in said main scanning direction (column 4, lines 32-45);

calculating means (306, 314) for moving said carriage (100) to detect the pattern elements of the test pattern with said pattern detecting means (200), for detecting a print position of the pattern elements based on a detection result of said position detection means when a rising/falling edge of a binary signal obtained by said binary conversion means (304) is generated, and for calculating a mounting deviation error of each head in said main scanning direction (figure 10, column 7, lines 30-46, column 8, lines 1-13),

wherein said position detection means is based on a linear scale (120) provided on a movement path of said carriage (100).

Regarding claim 2, the test pattern includes vertical bars (404) extending in the sub-scanning direction substantially perpendicular to said main scan direction (figure 5).

Regarding claim 3, the test pattern includes horizontal bars (408, figure 5) extending substantially in parallel with said main scan direction and the image forming device further comprises:

conveyance amount detecting means (160, figure 3) for detecting a conveyance amount of the print paper in the sub-scan direction substantially perpendicular to the main scan direction (column 4, lines 46-58); and

measuring means (308) for measuring the conveyance amount equal to or smaller than a minimum unit determined by a resolution of said conveyance amount detecting means (160) (column 7, lines 43-46),

wherein said calculating means (306, 314, figure 10) moves the paper on which the test pattern is printed, with the use of said paper conveying means with respect to the carriage to detect the pattern elements of the test pattern with said pattern detecting means, detects the print position of the pattern elements based on the detection results of said conveyance amount detecting means (160) and said measuring means (308) when a rising/falling edge of the binary signal obtained by said binary conversion means (304) is generated, and calculates an amount of mounting deviation of each head in a sub-scanning direction based on the print position of the pattern elements printed by each head (figure 10, column 7, lines 30-46).

Regarding claims 4, 13 and 14, the pattern detecting means (200) includes light emitting elements (232, 234) and a light receiving element (240) (column 6, lines 19-27).

Regarding claims 7 and 10, a print position is based on an average value of the width of the detected vertical bar (figure 17, column 8, lines 61-64).

Cobbs et al. discloses, regarding claim 11, a method for use on an image forming device with a linear scale (120) provided on a carriage movement path, for detecting a deviation between a print position actually printed on a print paper by a head and a print target position said method comprising:

printing a predetermined print element (figure 5) at the target position on the print paper by the head mounted on a carriage (100) that scans in a major scanning direction (column 6, lines 51-67);

detecting said print element with a sensor (200) mounted on the carriage (100) (column 5, lines 36-45); and

when the print element is detected with the sensor (200), detecting a position based on said linear scale (120) when the print element is detected and obtaining the deviation between the detected position and the print target position (column 2, lines 48-57).

Cobbs et al. fails to disclose, regarding claim 1, that the position detection means includes high resolution position detection means for detecting a position more finely than a minimum unit determined by the resolution of the low resolution linear scale (120) and a combination of the high and low resolution detecting means are utilized to detect the position of the pattern elements.

Cobbs et al. fails to disclose, regarding claim 5, that the low resolution position detection comprises a counter for counting a timing signal based on said linear scale (120) wherein said high resolution detection means comprises a timer which is initialized by said timing signal and measures a time with a predetermined clock signal.

Cobbs et al. fails to disclose, regarding claim 8, means for measuring a unit time interval of said linear scale at a time said pattern elements are detected and means for correcting a measured value of said timer based on the measured value and a theoretical value of said unit time interval.

Cobb et al. fails to disclose, regarding claim 11, providing a timer for detecting a position within a unit interval determined by a resolution of said linear scale (120) and detecting a high resolution position within the unit interval with the timer.

Cobb et al. fails to disclose, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof.

Goetz et al. discloses, regarding claim 1, position detection means for detecting the position of a print carriage in a main scan direction which includes high resolution position detection means (the circuitry producing the CKOUT signal as shown in figures 4A and 4B) for detecting a position more finely than a minimum unit determined by the resolution of low resolution position detection means (86, 88) (column 3, lines 15-25) in order to achieve higher resolution print position detection without utilizing an increased cost high resolution encoder (column 2, line 60 - column 3, line 4, column 7, lines 29-33).

Goetz et al. discloses, regarding claim 5, that the low resolution position detection comprises counters (86, 88) for counting a timing signal (CLK signal) based on a linear scale (20) (column 4, lines 43-55) wherein said high resolution detection means comprises a timer (CLKOUT signal) which is initialized by said timing signal and measures a time with a predetermined clock signal (column 4, line 56 - column 5, line 29).

Goetz et al. discloses, regarding claim 8, means for measuring a unit time interval of said linear scale (this corresponds to the means for generating the SIN signal

Art Unit: 2853

in figure 5) and means for correcting a measured value of said timer (this corresponds to the means for generating the QPRN signal of figure 5) based on the measured value (SIN) and a theoretical value (INPUT A) of said unit time interval (column 6, lines 44-63).

Goetz et al. discloses, regarding claim 11, providing a timer (the circuitry that produces CKOUT signal as shown in figures 4A and 4B) for detecting a position within a unit interval determined by a resolution of a linear scale (20) and detecting a high resolution position within the unit interval with the timer (column 3, lines 15-25).

Goetz et al. discloses, regarding claim 12, correcting the high resolution position within the unit interval based on an actual measurement value measured in a minimum interval of said linear scale and a theoretical value thereof (column 6, lines 44-63, figure 5).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to provide the means and steps of Goetz et al. to establish a higher resolution and corrected timing signal from the encoder of Cobbs et al. to establish higher resolution print head position determination.

The motivation for doing so would have been to correct for errors in the codestrip detection and to more precisely determine the position of print heads as taught by column 2, line 42 - column 3, line 8 of Goetz et al.

Allowable Subject Matter

2. Claims 6, 9, 16 and 17 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the indication of the allowability of claims 6, 9, 16 and 17 is the inclusion therein, in combination as currently claimed, of the limitation of the test pattern printing means wherein, **for each head**, said test pattern includes as a pattern element at least one vertical bar extending in the sub-scanning direction substantially perpendicular to the main scanning direction and wherein said pattern printing means divides said vertical bar into **a plurality of portions** and causes each of **different portions of a single head** to print a plurality of dots sequentially in **a plurality of passes**, said plurality of dots constituting a portion of said vertical bar. This limitation is found in claims 6, 9, 16 and 17 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The examiner recognizes that the allowable subject matter provides advantages to the art including, but not limited by, a reduction in a read error when reading the vertical bar test pattern as explained by applicant in relation to the exemplary embodiment of figures 20a, 20b, 21.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

3. Applicant's arguments filed June 2, 2003 have been fully considered but they are not fully persuasive.

The applicant's perfected foreign priority to April 22, 1999 has eliminated Ikeda US 6,390,588 as a prior art reference and the rejections utilizing this reference are withdrawn.

Applicant's have argued regarding Goetz et al. '416, as utilized in the applied rejection, that Goetz et al. corrects the duty cycle of encoders but fails to provide a high resolution position detection.

The examiner strongly disagrees with this assessment of Goetz et al. '416. A review of column 2, line 60 - column 3, line 4, column 7, lines 29-33 and the abstract of Goetz et al. should make it clear that the synthetic encoder pulse is intended as a higher resolution position detection means than the low resolution linear scale (the high resolution detection is twice the resolution of the scale as taught in the abstract). This has the benefit of eliminating errors by providing higher resolution position detection (see column 2, line 42 - column 3, line 8 of Goetz et al.) Combined with the teachings of Cobbs et al. which utilizes a low resolution encoder scale as a reference for determining the print position of vertical test lines it would have been obvious for a person of ordinary skill in the art at the time of the invention to utilize a high resolution synthetic encoder pulse from the low resolution scale detection as the reference since the motivation of greater precision detection is clearly taught by Goetz et al.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell Adams, Art Unit 2853, can be reached at (703) 308-2847. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Art Unit: 2853

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet June 10, 2003

BM 6/10/2003


JUDY NGUYEN
PRIMARY EXAMINER